Patent Application: 10/749,024

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In reply to Application of:	Parimal Pal Chaudhuri
Application No.:	10/749,024
Filing Date:	December 30, 2003
Art Unit:	2136
Examiner:	Fikremariam A. Yalew
Confirmation Number:	9229
Title:	Systems and Method for Data Encryption and Compression (EnCompression)

Mail Stop Amendment
Commissioner for Patents
P.O Box 1450
Alexandria, VA 22313-1450

Subject: In Response to the objections raised by the examiner in office communication dated 2/10/2008 rejecting the claims registered in PATENT APPLICATION NO. 10/749,024

Dear Mr. Moazzami Nasser:

My apologies for the delay in responding back on the Office communication from the Patent Office, but the communication reached my agent only on 30th April 2009, probably because of mail delays.

I am writing to you, as you the supervisor of Mr. Fikremariam Yalew, the examiner of my patent application. For the last three correspondences, I have been trying unsuccessfully to explain to Yalew the basic difference between my patent application and another patent Mr. Yalew sights frequently. I sincerely hope you would be able to resolve this matter.

I am extremely disturbed with the type of comments examiner Mr. Fikremariam Yalew, has repeatedly voiced in his correspondence while rejecting the claims of my patent application. The examiner has repeatedly referenced a former patent (referred to by Lafe's patent) in the correspondence without the understanding of the basic difference in approaches and repeatedly quoted sections wrongly from Lafe's patent. His comments, as I have discussed with other patent attorneys and my fellow Cellular Automata (CA) researchers worldwide, could be best associated either with a complete lack of understanding of the technical subject matter or for the sole intention of rejecting the patent.

In my detailed response I have explained – why examiner's comments are incorrect.

As an academician/researcher from outside USA, I have a lot of respect for the US Patent system and hence applied for my patent in 2003. I had expected correct assessment of my patent application.

I would sincerely request your office to re-examine my patent application with a different examiner. I am objecting to the basic premises under which the claims of the patent have been rejected. I understand that the Patent Office might be overloaded and backlogged because of the huge number of patents that have been filed. But that is not an excuse for rejecting valid patent claims. I sincerely believe the claims in the current patent are legitimate and request a re-examination.

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Alternatively, I am open to an open and honest discussion with you directly on why the patents have been rejected.

Yours sincerely,

P Pal Chaudhuri

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The Responses from me are noted corresponding to the Serial number and Page number
referred to "Response to Arguments" in the communication of US Patent and Trademark office
with Mail date 2/10/2009

(1) PAGE No. 2 - Point No. 3: It refers to Claims 11 and 21 which were rejected earlier under 35
USC 101.

Response:
The examiner failed to understand the technical content of the claims. The original text noted in
the claims is reproduced below to establish the point.

The original text of Claim 11: "Logic encoded in media for encompressing a data stream, when
executed the logic operable to: compress vectors from the data stream using one or more
Multiple Attractor Cellular Automata (MACA); and encrypt the compressed vectors using multiple
Cellular Automata (CA) transforms."
The original text of Claim 21: " A system for encompressing a data stream, the system
comprising: a first module operable to compress vectors from data stream using one or more
Multiple Attractor Cellular Automata (MACA); and a second module operable to encrypt the
compressed vectors using multiple CA transforms".

**The claims 11 and 21 are based on the innovative concept of Multiple Attractor Cellular
Automata (MACA) used for the integrated operation termed as encompression (encryption
+ compression) of a data stream.**

Examiner's response dated 19th October, 2008 does not deal with the basic claim (noted in
bold above). Ignoring the claim of innovation of MACA used for data compression, the examiner
comments "Claim 11 directed a computer readable media/carrier waves that includes data signal
that does not fall within one of the statuary classes of 101. Further, the Examiner's response
dated 28th February, 2009 states – " ——one of the ordinary skill in the art could implement the
claim using software modules".

Examiner is requested to take note of the following:
   (a) I introduced the concept of MACA (Multiple Attractor Cellular Automata "in my book
       "Additive Cellular Automata: Theory and Applications" published by Wiley-IEEE
       Computer Society Press in July 1997, ISBN 978-0-8186-7717-5). The concept of MACA
       did not exist in the literature prior to 1997 and no knowledgeable person would refer to
       this invention as ordinary art implementable using generic software modules.
   (b) Data compression and encryption can be done in a large number of different ways.
       Further, the schemes used for Compression and encryption are totally different. I have
       used CA in an innovative and unconventional way to integrate both encryption and
       compression operations as an integrated operation (encompression). This has never
       been done in previous literature.

In the above context, rejection of claim - **using the single platform of CA both for
compression and encryption employing the innovative concept of MACA** – is unacceptable.
Examiner is requested to study the contemporary literature prior to making a statement – "one of
the ordinary skill in the art could implement the claim using software modules". It is expected the
examiner review prior art on Cellular Automata (CA), and prevailing Data compression and
encryption technologies.

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(B) PAGE No. 2-4 – Point No. 4

Response:

It refers to the Claims 1,3-10,13-20,21,23-30 that highlight the innovative features of the proposed scheme using the concepts of – (a) CA based code book, (b) MACA (Multiple Attractor Cellular Automata) based two class classifier, (c) using MACA for compressing vectors, (d) Programmable CA (PCA) and its application for generating different CA transforms, (e) using PCA based four level of CA transforms – linear, affine, non-affine transforms

While rejecting the above claims the Examiner states that all these features are available in Lafe's patent (Patent No. US 6,456,744 B1 dated 24th Sept., 2002 entitled – Method and Apparatus for video compression using sequential frame cellular automata transform). Such comments show lack of understanding on the part of the Examiner in respect of – (a) the basics of Cellular Automata (CA), (b) the basic schemes employed for Data Compression, (c) the details of Lafe's patent, and (d) the technology proposed in the current patent application.
The reason for this strong argument is elaborated below with reference to the column and line number of Lafe's patent pointed by the examiner.

    (a) Examiner states – " --- the prior art teach generating codebook, MACA operable (see Lafe Col 5 lines 20-63 and Col 6 lines 46-60" – this is incorrect. **Lafe's patent does not use codebook and MACA and the above is incorrectly referenced as quoted above.**

    (b) Examiner states – " ----the prior art teach storing the codebook using one or more MACA based two class (See Lafe col 11 lines 38-57)" - this is incorrect. **Lafe's patent does not use codebook using one or more MACA-based two class classifier and the above is incorrectly referenced as quoted above.**

    The scheme of compression used in Lafe's patent (as pointed out by the applicant repeatedly in his response dated 19th Oct., 2008) employs Transform coding and not Vector quantization scheme that employs codebook. Further, nowhere in the literature other than my application, there is any reference of using MACA for storing codebook.

    (c) Examiner states – "------prior art teach compressing the vectors --- one or more MACA (See Lafe col 5 lines 30-35 and col 8 lines 29-48)" - this is incorrect again. The examiner misses the point that – storing the transform coefficients derived out of transform based compression (used by Lafe) and the storing the actual representative data for vector quantization scheme employing codebook (as used in the current patent application) are completely different.

    (d) Examiner states – "---prior teach encrypting the compressed vectors using four levels of CA transforms —(See col 6 lines 32 through col 7 lines 65)" – this is incorrect and exposes the lack of understanding of the basics of transform based compression technology on the part of the examiner.

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(C) PAGE No. 4 – Point No. 5:

Response:

Examiner states "Correction of the following is required: the term "computer readable media" in claims 11-20 does not have antecedent basis in the specification."

Response:

In this age of digital technology, all the information generated are usually computer readable and hence there is no separate mention of "computer readable media" in the claims. Nevertheless, the antecedent basis of the specification has been clearly laid down in page 2 of the patent application under the heading "BACKGROUND".

(D) Page No. 4 – Point No. 6, 7, and 8:

Response:

It refers to Claims 11 and 21 – Detailed explanation have been noted in the response under Item (A) noted earlier in response to Point number 3 of Page 2. My response points to the fact that the concerned examiner lacks the desired knowledge in the field of Cellular Automata and fundamentals of Compression and Encryption technologies. In view of this lack of knowledge the examiner wrongly interprets the 35 U.S.C. 101 and rejects the claims.

(E) Page No. 5-7 – Point No. 9 to 19:

Examiner refers to 35 U.S.C. 103 to reject the claims 1, 3-11, 13-21, 23-30.

Response:

The Examiner has correctly identified that this patent application deals with (a) Cellular Automata (CA), (b) Data Compression, and Data Encryption under an integrated operation named as ENCOMPRESSION. He also noted that Lafe's US Patent No. 6456744 uses CA and Compression, and (d) Lafe's US Patent No.5677956 employs CA for Data Encryption. Examiner establishes a link among the terminologies (a) to (d) and rejects all the claims stating that all the subject claims in the current application have been already claimed in Lafe's US Patent No. 6456744 and 5677956.

Examiner failed to appreciate the **following facts** even though pointed out repeatedly by the applicant in former correspondence with the examiner:

(a) Cellular Automata (CA) is a concept introduced by J von Neumann in 1950's. A CA operates in discrete space and time on an input to generate an output. This operation is referred to as CA Transform. A large number of researchers have used CA in many disciplines using CA transforms. NO SINGLE AUTHOR CAN CLAIM A PATENT ON THE BASIC CONCEPTS OF CA AND THE CA TRANSFORMS.

(b) The basic compression technology used by Lafe is totally different from the one used in the current application. While Lafe used transform based coding for compression, the current compression scheme employs a totally different scheme referred to as Vector Quantization employing Codebook. The Transform based coding will store the transform coefficients in memory, but this can never be referred to as Codebook used to store the data vectors for Vector Quantization scheme. Storing the original data vector and storing the transform coefficients are altogether two different approaches. The Examiner failed to understand these two different concepts used in Data Compression schemes.

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(c) While Lafe used variable number of non-liner CA transforms for encryption, four different kinds (fixed In number) of CA transforms (liner, affine, and non-affine) are used in the current application. The CA transforms used by Lafe in his scheme are totally different from the transforms used in the current scheme. The method of generation and application of transforms are also totally different.

While a general summary is noted above to establish the fact that the Examiner has wrongly rejected the subject claims, point by point answer to the issues raised by the Examiner in pages 6 and 7 are now noted.

(F) Page No. 6 – Point no. 11:

It refers to the claims 1,11,21 where examiner mentions " Lafe discloses ---------Multiple Attractor cellular Automata (MACAs) ---.

Response:

The examiner failure to understanding the CA fundamentals and MACA characteristics has led to this incorrect comment. No one, including Mr. Lafe himself will be able to demonstrate that he used MACA in his compression and encryption patents. Lafe never used MACA In Col 2 lines 30-38, col. 15 lines 49-51. MACA is the new concept introduced by me for the first time in my book in 1997 – please refer to "Additive Cellular Automata: Theory and Applications published by Wiley-IEEE Computer Society Press in July 1997, ISBN 978-0-8186-7717-5).

(G) Page No. 6 – Point No. 12:

It refers to Claims 3, 13, 23. Examiner mentions " Lafe disclose the -----one or multi-stage MACA – based two class classifier ---- (See Lafe com 11 lines 38-57)".

Response:

Again, the examiner has failed to understand the CA fundamentals and MACA characteristics. With no amount of imagination one can make such a comment that Lafe used MACA based two class classifier. Lafe neither used MACA nor two class classifier In col 11 lines 38-57.

(H) Page No. 6 – Point No. 13:

It refers to the claims 4,14,24. Examiner mentions " Lafe disclose --------- MACA based two class classifier ---- (See Lafe col 11 lines 38-57)".

Applicants Response:

The examiner has failed to understand yet again the CA fundamentals and MACA characteristics. Lafe neither used MACA nor two class classifier in Col 11 lines 38-57.

(i) Page No. 7 – Point No. 14:

It refers to claims 5,15,25. Examiner mentions " Lafe disclose --------- one or more MACA comprising deriving code-book for the vectors (See Lafe col 5 lines 30-35, col 8 lines 29-48.

Applicant's Response:

The examiner has failed to understand the CA fundamentals, MACA characteristics, basics of Data Compression methods. There is no validity to the comment that Lafe's patent uses " one or more MACAs comprises deriving code-book indices for the vectors" – refer to examiner's comment In page 7 under point no. 14). Lafe's compression scheme is totally different from

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the Vector Quantization scheme used in the current application. Lafe neither used MACA nor codebook in Col 5 lines 38-57.

Any CA knowledgeable person will understand that storing transform coefficients in memory for **Transform coding based compression** (used in Lafe's patent) is an altogether different aspect compared to storing data vectors for **Vector Quantization scheme for data compression (the applicant's patent)**.

It is to be noted that the examiner makes multiple references to MACA, codebook to store vectors etc. in Lafe's patent. Lafe's patent never uses these techniques. It is hereby requested that the Patent office refrains from pointing and quoting wrong and non-existant references.

(J) Page No. 7 – Point No. 15:

It refers to the claims 6,16,26. Examiner mentions "Lafe disclose the ----
------using a series of reversible transforms that use one or more of liner CA, Additive CA, non-linear CA configured in a PCA at one or more time steps (See Lafe col 6 lines 32 through col 7 lines 65)".

Response:

Examiner refers to the use of linear CA, Additive CA, non-linear CA, PCA etc in Lafe's patent. There is absolutely no reference at all in Lafe's patent (col 6 lines 32 through col 7 lines 65) for the use of linear CA, additive CA and PCA. Lafe's patent used all non-linear CA transforms and he never employed the concept of PCA (Programmable CA). The very concept of PCA was first introduced by me in my CA book referred to earlier.

(K) Page No. 7 – Point No. 16:

It refers to the claims 7,17,27. Examiner mentions "Lafe disclose ----- using four levels of transforms (see Lafe col 6 lines 32 through col 7 lines 65)".

Response:

Examiner has referenced four levels of transforms in Lafe's patent. There is no validity to the examiner's comment that Lafe's patent (col 6 lines 32 through col 7 lines 65) uses four levels of transforms. Please do refer to the explanation noted by Lafe in his patent. Lafe mentions that the number of non-linear transforms to be used will depend on ....until the residual error is zero for all the data points". The method of encryption used for the current application is hence totally different from the one used by Lafe. Lafe employs variable number of non-linear transforms and not fixed number of four transforms – wrongly referenced by the examiner.

(L) Page No. 7 – Point No. 17:

It refers to the claims 8,18,28. Examiner mentions "Lafe disclose ---------encrypting the compressed vectors using multiple CA transforms comprises using one or more linear transformations, affine transforms, and non-affine transforms (see Lafe col 6 lines 32 through col 7 lines 65)".

Response:

The examiner probably needs to be educated on the meaning of linear, affine, and non-affine transforms. There is no validity to the examiner's comment that Lafe's patent (col 6 lines 32 through col 7 lines 65) uses one or more linear transformations, affine transforms, and non-affine transforms. As noted in the reply to Point No. 16, Lafe's patent used a number of non-

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linear transforms – the number is dynamically determined "until the residual error is zero for all the data points".

Use of CA and the associated CA transforms are the general concepts employed in different disciplines. The CA based encryption schemes will significantly differ depending on the types of different transforms generated and how the encryption scheme utilizes those transforms. In this respect the current application utilizes the CA based encryption scheme employing **four fixed transforms (linear, affine, non-affine)** that is totally different from Lafe's scheme that employs **variable number of non-linear transforms.**

◄(M) Page No. 7 – Point No. 18:

It refers to the claims 9,19,29. Examiner mentions " Lafe disclose ---------transmitting the encompressed data across communication link (see Lafe col 3 lines 47-50 and col 4 lines 29-53).

Response:

In page 1 of the patent application under the heading Technical Field, it is clearly mentioned that " ----- a system and method that implements encryption and compression operations as a fully integrated single operation using a computing model based on Cellular Automata".
In this context Examiner has failed to take note of the following facts.

1. In his two patents Lafe used CA based schemes – one for compression and another (a second) for encryption. A person having basic knowledge of CA will appreciate the fact that the two schemes used by Lafe for compression and encryption are totally different – this is obvious and natural simply because the **basic requirement of these two operations are diametrically opposite.**
2. Even though the requirements of these two operations are different, the present patent application invents an integrated operation named as ENCOMPRESSION (ENcryption + COMPRESSION) using the innovative concept PCA (Programmable CA), first proposed by me in my CA book referred to earlier. A PCA is operated with a program written for CA – it is not the conventional program.
3. Hence, an output derived after this integrated operation is referred to as Encompressed data file. Here the word 'Encompressed' does not refer to the art of employing encryption on a data file. It refers to the art of employing the integrated operation ENCOMPRESSION (ENcryption + COMPRESSION) on the input data file.
4. Lafe's patent on encryption send the data across communication link after employing encryption. By contrast, the current application sends the data over communication link after ENCOMPRESSION operation – the integrated operation that covers both compression and encryption.

(N) Page No. 7 and 8 – Point No. 19 :

It refers to the claims 10,20,30. Examiner mentions " Lafe disclose ----decrypting the transmitted encompressed data using multiple CA transforms (see Lafe col 9 lines 14 –35 and col 11 lines 50-67)".

Response:

Examiner has failed to take note of the facts noted under points 1 to 4 in the response to the Point No. 18 noted above. The current patent application, as clarified in the response under Point No. 18, de-ENCOMPRESS the transmitted data file – it involves two steps executed as an integrated operation termed as De-encompression using Programmable CA (PCA). With no amount of imagination one can claim that Lafe "decrypting the transmitted **encompressed** data -----" (as mentioned by the examiner in page 8 first line).

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Lafe's patent on encryption mentions decrypt of the encrypted data and not encompressed data. It seems the examiner fails to understand the difference between these two terminologies encrypted and encompressed (encrypted and compressed).

(O) Point No. 18: As per claim 10, 20, 30: the combination of Lafe and Lafe' disclose — decrypting the transmitted encompressed data using multiple CA transforms (See Lafe col 9 lines 14-35 and col 11 lies 50-67).

Response:

As explained in the response for Point No. 17, the word Encompression has been coined by the inventor of the patent application to refer to integrated operation ENCOMPRESSION (Encryption + COMPRESSION). On sequential execution of compression followed by encryption, it should be referred to as "Compressed THEN Encrypted" data rather than EnCompressed data claimed in the patent application. In the patent application 10/749,024, D'enCompression of EnCompressed data occurs by employing multiple CAs as the pattern matching tool. By contrast, the decryption and decompression (as two separate sequential steps) in Lafe's patent employs CA as traditional mathematical tool to derive reverse transform.

The very application of CA as a pattern matching tools, as reported in the patent application 10/749024, is totally different from the use of CA in Lafe's patents as traditional mathematical tool for generating transform coefficients.